Editorial

Hotspots and Coldspots

In 1988, the celebrated British ecologist Norman Myers gave the concept of biodiversity hotspots as a method to identify most important areas for conservation (Myers 1988). This concept was later expanded and criteria for identifying hotspots were developed – the region must support at least 1,500 plant species found nowhere else in the world, and it must have lost at least 70 per cent of its original vegetation. It was suggested that if we protect the biodiversity hotspots of the world, nearly 30-50% of the world's biodiversity would be protected (Myers 1990; Myers *et al.* 2000). Hotspots are areas with very rich biodiversity such as the tropical rain forests of Brazil, Indonesia, northeast India and the Western Ghats. There are supposed to be 12 mega-diversity countries in the world, and India is one of them. 30-50% of amphibian, reptile, mammal, bird and plant species occur in 25 hotspots that occupy about 2% of the land surface (except the ice-covered polar regions) (Myer *et al.* 2000). Conservationists and funding agencies, looking for easy solutions to the biodiversity crises of the world fell for the hotspot conservation concept. Who would not? By protecting less than 2% of the land's surface, if we can save 30 to 50% of the species, then we should accept the hotspot model of conservation. But what about the habitats (and the species) that do not qualify the hotspot criteria? What about the 50-70% species that do not occur in the hotspots? Are they less important? Do they also not play their role in maintaining the life support system of this world? Do they not have endemic and rare species that need protecting? Are these areas not important culturally, spiritually, economically and scenically? Shouldn't we have a taxa or habitat representative and ecoregion approach for global biodiversity conservation? The whole concept of biodiversity hotspot conservation approach has been questioned recently (Smith *et al.* 2001; Kareiva and Marvier 2003; Entwistle 2004).

The high altitude cold deserts of India, China, Central Asia and South America, the wind-swept grasslands of Mongolia, the hot deserts of Asia, the Middle East, northern Africa and North America, the boreal forest of Europe, the scrub forest of India – all these may not have high species diversity and would not fall in the hotspot category, but these ecosystems are also important for conservation initiative and funding. We can call them biodiversity 'coldspots'. As desert and grassland species are generally thinly and widely distributed, they need a landscape approach for conservation. Moreover, millions of people live in these ecosystems and have great impact on the ecology and distribution of wild animals, thus conservation actions become much more complex. In the hotspot conservation paradigm, we can set aside human free, relatively small protected areas (PAs) and save huge numbers of endemic and rare species, but in the coldspots, a different conservation approach is needed. Here the small PAs (about 500 to 1000 sq. km) would not make much conservation sense as the genetically viable populations of any target species range in much larger areas (e.g. Great Indian Bustard *Ardeotis nigriceps*, Snow Leopard *Uncia uncia*, Wolf *Canis lupus*). Therefore, in deserts, grasslands and marine ecosystems we need thousands of sq. km of protected areas. Can Man be excluded from such large PAs?

The IUCN Red List of 2004 includes an assessment for 38,047 species. The results are shocking: 15,589 species are threatened with extinction (listed as Critically Endangered, Endangered or Vulnerable); 844 species are Extinct or Extinct in the Wild; 3,700 species are listed as Near Threatened or Conservation Dependent; 3,580 are Data Deficient; and, 14,344 are Least Concern (Baillie *et al.* 2004). The 15,589 species threatened with extinction constitute only 1% of the world's described species. Although statistics of how many of these threatened species are found in the world's hotspots is not available to me, a quick glance at the bird list shows that for many species, especially those found in marine, temperate forest, desert and grassland, the hotspot model of conservation priority setting would not be adequate. BirdLife International's Important Bird Areas (IBAs) (Grimmett and Jones 1989) and Endemic Bird Areas (EBAs) (Stattersfield *et al.* 1998) approaches are very objective in identifying sites for conservation. It has been found that many sites important for birds are also important for other biodiversity. In the IBA/EBA process, the biodiversity hotspots are invariably identified as IBAs/EBAs, but scrubland, grasslands,

mangroves, taiga, boreal forests etc., also found place in the IBA/EBA lists. Most endemic bird species are found in only one EBA (Norris and Harper 2004) and many EBAs do not fall in the hotspots category (of Myers *et al.* 2000). Norris and Harper (2004) have shown that out of the 39 ecologically vulnerable EBAs, 22 are not inside any hotspot region of Myers *et al.* (2000). They conclude that existing priority-setting exercises for hotspots of endemism under-represent ecologically vulnerable sites. Therefore, if we concentrate mainly on hotspot approach of conservation, some of the most threatened species and their habitat would be left out.

Olson *et al.* (2001) have identified 14 major biomes worldwide. In the assessment of the number of threatened mammals, birds and amphibians occurring in each biome (Baillie *et al.* 2004), the highest number of threatened species in all the three taxa were found in Tropical/Subtropical Moist Broadleaf Forest, and Tropical/Subtropical Dry Broadleaf Forest (the biodiversity hotspots). Surprisingly, the third and fourth biome categories having the highest number of threatened species were Tropical/Subtropical Grassland, Savanna and Shrubland, and Montane Grassland and Shrubland. Desert and Xeric Shrubland biome was high in the priority for mammals and birds, almost equal to Tropical/Subtropical Dry Broadleaf Forest biome (Baillie *et al.* 2004, p. 69).

The 'hotspots' conservation model is certainly very objective, but unfortunately it does not cover all the biodiversity priority conservation areas. A 'habitat-taxa representative' model is more subjective but it covers most, if not all, ecoregions of the world (Dinerstein *et al.* 1995; Ricketts *et al.* 1999; Wikramananyake *et al.* 2002). Perhaps we have to blend the two models in the conservation priority-setting exercises. It is time to accept that 'coldspots' are as important for biodiversity conservation as the hotspots.

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